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Address of the Committee appointed at the Convention of Civil Engineers, which met in Baltimore, Md. February 11, 1839.

AT A CONVENTION OF CIVIL ENGINEERS OF THE UNITED STATES, which met in Baltimore on the 11th of February last, in pursuance of a call from a highly respectable meeting of members of the profession in Augusta, Ga., the following resolution was adopted:

RESOLVED, That the President appoint a Committee of five to draft an address to the Civil Engineers of the United States, and to superintend the publication of such portions of the proceedings of this Convention as they may deem expedient.

The President appointed Messrs. Fisk and Trimble of Maryland, S. W. Roberts of Pennsylvania, J. B. Jervis of New York, and G. W. Whistler of Connecticut. Mr. Whistler having declined the appointment in consequence of his inability to attend; Mr. Edward Miller of Pennsylvania was subsequently appointed in his place.

A majority of the Committee met according to appointment at the Hall of the Franklin Institute in Philadelphia, on the 20th of March. 1839, and adopted the following Address.

The Committee believe that they will best perform the duty assigned to them, of preparing an address to their professional brethren upon the subject of the proposed society of American Civil Engineers, by confining their remarks to what they deem the objects and advantages of such an Institution.

Forty members of the profession from eleven States of the Union, composed the Convention at Baltimore, and a number more expressed through their friends who were present, their approbation of the object in view, and their regret at being unable to attend.

The principal business transacted by the Convention, was the election of seventeen Engineers, from different parts of the Union, as delegates to frame a Constitution and form the Society. The time fixed for their meeting was the second Wednesday in April next, and the place the Hall of the Franklin Institute in Philadelphia. A gratifying degree of unanimity characterized the proceedings of the Convention, and a confident hope was generally expressed that the delegates elected, (many of whom

were not present,) would form a Society, the obvious utility of which would secure its perpetuation.

Public works are now so extended in our country, and the mass of experimental knowledge to be gained from those in use is so great and so peculiarly applicable to our circumstances, that it is even more valuable to the American Engineer than what he can learn in Europe, where larger means have permitted greater expenditures. In this country it is of paramount importance to obtain the greatest amount of useful effect at the smallest cost; and of attempts to attain this end, the Union now contains a multitude of instructive examples. Some have been eminently successful, and others less so; but of either kind, the student or the more advanced engineer, too often seeks in vain for any satisfactory written or printed description, and is unable to obtain any thing more than vague, doubtful and often incorrect information. This evil can only be removed by the exertions of the Engineers themselves. They are now established as a distinct class, and have long felt the want of such an association as that proposed, but it has hitherto been supposed that the proper time for its organization had not yet arrived.

The success which has attended the labors of the London Institution of Civil Engineers, its high standing and great usefulness, prove that such societies may be of great public utility when properly conducted, and are incentives to induce us to imitate so excellent an example.

It is admitted, however, that a society in this country must differ somewhat in its plan of operations from the British Institution, which can readily give utterance to its opinions elicited after frequent and full discussion, since a large portion of the members during the winter season have their residences within the limits of London. Here, however, owing to the vast extent of territory over which are scattered the members of our profession, the usefulness of the society must (for the present at least) depend more upon the facts and experience of its members made known in written communications, than upon their opinions orally expressed in public discussions.

The very fact that our improvements are so widely spread, that few, if any, members of the profession are able to give even the most important of them a personal examination, affords, perhaps, the strongest argument in favor of a Society that shall, by a concert of action, bring the experience of the whole country within the reach of each member.

The difficulty of meeting at any one point, caused by the time and expense required in travelling from distant portions of so extensive a country as the United States, is a serious obstacle, but it has been much diminished by the facilities afforded by the Railroads already in use, which are among the valuable results of the labours of our Civil Engineers.

Though our Society may be less favourably situated than the one in London for frequent and public discussions, we nevertheless anticipate many important advantages to be derived from a personal intercourse and interchange of information among its members, and from the establishment of a permanent repository of the results of experience obtained from the most authentic sources.

The standing of the profession in our country, is fortunately such, that its importance need not be dilated upon; it is therefore the more necessary, that every thing in the power of the members should be done to add to its respectability and increase its usefulness. We look forward to the formation of the Society, as a valuable means of advancing these desirable ends.

We think, that the preliminary steps have been well taken; and as the late Convention has given the whole matter into the hands of the seventeen delegates, who were elected to frame the Constitution and form the Society, we hope that each of those gentlemen will feel, that an important and complimentary trust has been reposed in him, and exert himself to fulfil it in such a manner, as to advance the permanent interests of the profession of which he is a member. We trust, also, that each may appreciate the importance of attending at the time and place appointed for forming the Society, and will be willing to make some sacrifice for effecting that object; or if prevented from attending by uncontrollable circumstances, that he will express his views in writing, upon the subject of a suitable Constitution.

The Committee will close this communication by a quotation from the inaugural Address of the distinguished Thomas Telford, the first President of the London Institution, which appears to them peculiarly appropriate.

"In foreign countries, similar establishments are instituted by government, and their members and proceedings are under its control, but here a different course being adopted, it becomes incumbent on each individual member to feel that the very existence and prosperity of the Institution depend in no small degree on his personal conduct and exertions; and the merely mentioning the circumstance will, I am convinced, be sufficient to command the best efforts of the present and future members, always keeping in mind, that talents and respectability are preferable to numbers, and that from too easy and promiscuous admission, unavoidable, and not unfrequently incurable, inconvenience perplex most societies."

Signed by order of the Committee,

CHARLES B. FISK, *Chairman*

Third Annual Report of the Eastern Railroad Corporation.

To the Honorable the Legislature of the Commonwealth of Massachusetts:

The Directors of the Eastern Rail-road Company do hereby respectfully make their Third Annual Report of their acts and doings, receipts and expenditures, under their act of incorporation.

At the date of their last report about twelve miles of the road between Boston and Salem was mostly graded, and the bridges, culverts and other superstructures, on this part of the road nearly completed, and the iron rails and chairs, and other materials for the superstructure or railway, for the whole distance from Boston to Salem contracted for, and excepting the iron, mostly delivered.

The timely aid of the credit of the state, granted by the munificence and enlightened policy of the Legislature of the last year, to the amount of $90,000, enabled the Directors, on the opening of the spring, notwithstanding the embarrassed state of the business of the country to proceed vigorously in the completion of the road, and it was confidently expected that it would have been opened early in July—an unexpected delay in the arrival of the iron rails and chairs disappointed this expectation, and the road was not opened until the latter part of the ensuing month.

On the 27th of August, the road was experimentally opened, and the stockholders and invited guests transported over it.

On the 28th, the road was opened for public travel, since which time, however, considerable additional work has been done in finishing the road-way, principally in cutting the side ditches, and other works for the effectual draining of the cuts, and in widening in some cases the embank-

ments, and in covering exposed parts of the marsh embankments with rubble, and in laying down additional turn outs, switches, &c. So that the directors believe the road to be in an excellent condition.

Allusion was made in the last annual report to the selection of the form of rail and chair, which provides for a greater elevation of the rail above the road bed, than has been usual in other roads. The experiment thus far has been very successful, the rail has proved to stand very firm, and the chairs have resisted the shocks of the engines and trains without failure, except in a very few instances. Considerable advantage is also anticipated from the greater elevation of the rail in case of deep snows, although from the favorable state of the winter, in this respect, thus far this advantage has not been tested.

The directors consider this a proper opportunity to express their conviction of the enlightened policy of former legislatures of the Commonwealth, in granting the credit of the state in aid of individual enterprise, in carrying on and completing the great chain of internal improvement, in the state of which the Eastern Rail-road forms in their opinion an important link. Commencing as it does upon the navigable tide waters of Boston harbor, below all bridges or other obstructions, and united by said waters with the depot of the great Western Rail-road, at the South Cove, and passing in its course directly upon the tide waters of the harbors at Lynn, at Salem, at Beverly, at Rowley, at Parker's river, and at Newburyport, and on its way near to the harbor of Ipswich; and after passing the Merrimack, when it shall be continued according to the original intention of its projectors, and of the Legislature, who granted the charter, coming upon the deep and navigable waters of the Piscataqua, always accessible to steamboat navigation from the far East, it is destined to form through its whole length, the important channel of communication between the great Western Rail-road, and the extensive and fast improving East.

There is also another and important fact connected with the Eastern Rail-road, which the directors believe adds much to its importance as a great public work, which is the density of the population immediately along its line. This circumstance alone, according to the experience already had on other rail-roads, similarly situated, will, it is believed, ensure it an ample income. Wherever there are large masses of population whose occupation leads them to travel, increased facility for travelling acts as a stimulus to the increase of communication, to a degree not anticipated even by the most sanguine, and such has been the result on the Eastern Rail-road, so far as it has been completed. And the directors feel justified in expressing the opinion, that it has rarely, if ever, happened that so great an amount of public convenience has resulted from the completion of a line of rail-road communication, as has resulted in the opening of the road between Salem and Boston.

An act was passed by the Legislature on the day of April, 1837, extending the time for the completion of the road below Salem, for five years from the 30th of Sept. 1840, and soon after the opening of the road to Salem it became a question, whether the company should avail themselves of this extension, and delay the work upon that part of the road. To determine this question a very full meeting of the stockholders was held at Salem, on the 22d September last. At this meeting, the question was very fully considered, and the following resolves, proposed in a report of the directors were adopted with great unanimity, viz;

Resolved, That the Eastern Rail-road Company are pledged in good faith to go on and complete their rail-road as far as Newburyport.

Resolved, That the present time is the best time to proceed with the work of the road to its completion

Resolved, That it is the wish of the stockholders, that the directors proceed with all the despatch consistent with due economy, to construct and complete the road to Newburyport.

Resolved, That whenever satisfactory assurances are given that the rail-road from Portsmouth to the Massachusetts line will be built, the directors be requested forthwith to put the road from Newburyport to the line of the State under contract.

Under these resolves, proposals were issued for the work of grading, bridging and masonry upon the line from Salem to Newburyport, and contracts have been entered into for nearly all this work, at prices within the estimates of the engineer, with persons who, it is believed, are amply competent to complete their contracts. Under these contracts, the work is progressing with all the despatch consistent with due economy, and it is expected, that it will be completed and the road bed be ready for the superstructure or railway within the present year.

From a statement of the accounts of the treasurer, exhibited by that officer, it appears, that the cost of the road, as per his books, posted to Dec. 31st, 1838, including expenditures eastward of Salem, and cost of surplus lands, has been as follows, viz:

Preliminary survey,	$6,570 59
Engineering account,	28,915 77
Expense account,	7,322 75
Purchase at Lewis' wharf,	23,215 84
Land damages and fencing,	34,506 60
Salaries,	12,062 98
Depot wharves at East Boston,	69,648 50
Depot at Salem,	8,340 38
Cars and engines,	51,840 95
Grading, bridges, railway, East Boston Ferry, &c.,	589,478 94
	$831,903 30

And the receipts have been as follows, viz:

Received from the State of Massachusetts,	$290,000 00
Interest account and premium on State scrip	3,549 36
From assessments,	470,575 00
	$764,124 36

From a report of the superintendent exhibited by that officer, it appears, that the income arising from the business of the road, since it was opened up to the 31st Dec. 1838, has been as follows, viz:

Income from passengers,—

From Boston to Salem,	26,155½	tickets sold, at 50 cts.		$13,078 75
" do. 2d class,	635	"	37½ "	238 12
" Boston to Lynn and Marblehead,	11,303	"	31 "	3,503 93
" do do 2d class,	109	"	25 "	27 25
" Salem to Boston,	25,748	"	50 "	12,874 00
" do 2d class,	175	"	37½ "	65 62
" Salem to Lynn,	4,614	"	25 "	1,153 50
" Lynn to Boston,	9,787½	"	31 "	3,032 87
" do 2d class,	24	"	25 "	6 00
" Lynn to Salem,	4,493½	"	25 "	1,123 37

From Marblehead to Boston,	1,723	tickets sold, at 31 cts.,		$534 13
" do 2d class,	16	"	25 "	4 00
" Marblehead to Salem,	24	"	25 "	6 00
Way passengers, received, from them, $1,510 91 which sum averaged, equals,	3,593	"	42 57-1000	1510 91
Military companies, rec'd from them $263 91 which sum averaged, is equal to	628	"	42 57-1000	263 91
	89,032½	"		$37,422 36

And that the current expenditures arising from the business of the road for one hundred and eight running days, from the opening of the road to Dec. 31, 1838, inclusive, (Sundays being excluded,) have been as follows, viz :

Repairs on the road, ...	$1,795 20
" of engines and cars, and work done in machine shop	1,925 88
Fuel, ...	3,154 76
Salaries, wages and other expenses, including ferriages,	10,942 35
	$17,818 19

$2,000 of this extraordinary, and which will not occur again.

The whole income of the road has arisen from the carrying of passengers and their baggage, no merchandise trains having yet been run.

The foregoing account is made up to December 31st, 1838. Since that time up to this time, January 18, 1839, 11,069 passengers have been carried, making a total since the opening of the road, of 100,101 passengers.

All which is respectfully submitted.

GEO. PEABODY,
ROBERT G. SHAW,
AMOS BINNEY,
FRANCIS J. OLIVER,
STEPHEN A. CHASE,
DANIEL ADAMS, 3d,
B. T. REED,
L. THORNDIKE,
ISAIAH BREED,
Directors.

BOSTON, *January* 18, 1839.

Third Annual Report of the Nashville and Lowell Rail-road Corporation.

To the Honorable Legislature of the Commonwealth of Massachusetts ;

The Directors of the Nashua and Lowell Rail-road Corporation respectfully submit this, their *Third Annual Report* of their acts and doings, receipts and expenditures under their charter of incorporation.

Since our last annual report, the work upon the road has been steadily progressing, notwithstanding the many pecuniary difficulties of the times, and on the eighth day of October last, the road was opened for the transportation of passengers to a temporary depot within about three-fourths of a mile of the terminus at Nashua. Since that time, the track has

been completed, and on the twenty-fifth day of December, the permanent depot was prepared and the road opened through its whole extent. The road, however, is not fully completed, nor the arrangements for freight and passengers perfected, so that neither the total cost of the construction of the road, nor its present receipts and expenditures can now be given.

The following statement will exhibit a correct view of the financial affairs of the corporation, as they now appear from the books of the Treasurer, in those particulars required to be specified in the annual report.

The receipts have been as follows :—

Amount received for stock to date,			$236,275 21
" " for interest, &c.,			2,991 85
" " on loan of State scrip			50,000 00
" " on other loans,			17,823 55
			$307,090 61
" " for transportation of passengers, from October 8th to January 1, 1839			6,114 21
Total receipts to date,			$313,204 82

The expenditures have been as follows :—

Amount paid for land and fencing,	$42 558 30	
" " for grading and bridging	95,534 14	
" " for superstructure and rails,	91,898 11	
" " for depots and fixtures,	7,775 64	
" " for engineering and expenses,	16,589 76	
" " for engines and cars,	25,583 49	
		$279,939 44
" " for transportation of freight and passengers, ($807 64 being for fuel,)	4,185 34	
" " for repairs of road,	645 33	
" " for repairs of engines and cars,	282 15	
		5,112 82
Total expenditures to date,		$285,052 26

It will be observed, that the above statement contains the *expenditures* up to this date, and the *receipts* to the first day of January only. Since that day there has accrued for the transportation of passengers and freight, a further sum estimated as follows:

Amount accrued from passengers from January 1, to January 22, about	$1,400 00
" " for freight from November 23, to date,	1,325 00
	$2,725 00

Up to December fifteenth, an arrangement existed with the Boston and Lowell Railroad Corporation, by which they were to do all the transportation, and receive one-half of the gross receipts, until our engines and cars were in readiness for use. The amount so paid is included in the above statement. Since the road was opened, about 18,000 passengers have passed over it, being an average of 60,000 yearly. This number greatly exceeds the estimates heretofore offered by us, although the trade during the last three months has been less than the average of the year. The freight cars commenced running November twenty-third, and,

although not in full operation, on account of the season, want of depot, and suitable accommodations, and other embarrassments, the freight now averages about thirty-five tons per day. Application has been made to your honourable body, to fix the rate of tolls to be paid by us for the use of the Boston and Lowell Railroad, by which it is expected that some inconveniences under which we now labor may be remedied, the amount of transportation much increased, and the public greatly benefitted.

Not a share of the stock of the corporation has yet been sold for the non-payment of assessments, and the whole amount now due on the shares of delinquent stockholders is only about $3,600.

The cars now run in connexion with the trains upon the Boston and Lowell Railroad, making three trips each way daily for passengers, and one trip each way daily for freight. No accident to the passenger cars or passengers has occurred since the opening of the road.

Pursuant to the provisions of the act of your honorable body at the last session, to aid in the construction of this road, scrip or certificates have been received by the Treasurer of this Corporation from the Treasurer of the Commonwealth, to the amount of *fifty thousand dollars*. Being desirous of repaying the amount before the expiration of the period limited, we have thought it advisable not to make a sale of the bonds, but to borrow money upon their pledge, which has been done accordingly.

The road is not in such a state of completion at present, as to render a compliance with the requirements of the act of April 19, 1837, practicable on our part. We indulge the hope, however, that it may be effected, as well as the apportionment of the cost of construction of the separate portions of the road lying within the two States, (commissioners for that purpose having been appointed in both States,) at some period during your present session.

The act passed by your honorable body at its last session, and re-enacted by the Legislature of New Hampshire, at its session in June last, authorizing the union of the two corporations in New Hampshire and Massachusetts, known by the name of the Nashua and Lowell Railroad Corporation, in one body corporate, has been duly accepted, and such union effected. The act of your honorable body extending the time for the completion of our road, for the period of one year from the first day September last, has also been accepted.

All which is respectfully submitted.

DANIEL ABBOT,
JESSE BOWERS,
PETER CLARK,
ADIN HOLBROOK,
JOSEPH GREELY,
C. H. ATHERTON,
HENRY UPHAM,
Directors.

January 23, 1839.

Third Annual Report of the Norwich & Worcester Railroad Company.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts, now in Session:

The Directors of the Norwich and Worcester Railroad Company respectfully present their Third Annual Report, as follows:

Since their last annual report, the work upon the graduation, masonry and bridges of the Railroad has proceeded without interruption, and the road is entirely graded for the whole distance from Norwich to Worcester,

with the exception of a few hundred feet, which will be finished at a small expense, in about a month from this time. The amount of funds received into the treasury of the company from all sources, up to the 31st Dec. 1838, as appears by the books of the treasurer, amount to the sum of seven hundred, eighty-three thousand six hundred and seventeen dollars; and the whole amount expended up to the same date is seven hundred forty-two thousand, six hundred sixty-seven dollars forty-one three-fourths cents.

The company have adopted an edge rail of fifty-four and one half pounds weight per yard, with a chair of approved construction.

A contract has been perfected for the iron for the entire Railroad, to be delivered as soon as it can be manufactured and shipped to this country.

With the exception of one or two miles, contracts have been made for the delivery of the timber during this winter and spring, and unless there is some delay not anticipated in the manufacture or delivery of the iron from Europe, the road will be in operation for the whole distance in the ensuing autumn.

The timber adopted for the superstructure are sleepers of white oak, chesnut or cedar, seven feet long, faced on two parallel sides to a width of five inches, and to measure not less than six inches in depth or thickness, the ends to be cut square and the bark removed. The sills of chesnut, hemlock or pine, eight by four inches, in lengths of eighteen feet or upwards. Under pieces of the same eight by four inches.

On such portions of the road, where the soil was not good, it has been removed and gravel put on to the depth of about two feet.

The connexion of the Railroad with the Boston and Worcester Railroad, at Worcester, will be convenient to both corporations; and will be so arranged, that the cars may readily pass from one road to the other; and at Norwich, the depot is at the steamboat wharf, and will be so constructed as to facilitate the transhipment of goods and passengers between the cars and the steamboat.

The act uniting the corporations in the states of Massachusetts and Connecticut requires that the accounts of the company shall be annually examined by the commissioners appointed by the governors of the states. Accompanying this report, and constituting a part of it, is the report of the commissioners on this subject.

It is, perhaps, proper to remark, that the directors have increased confidence in the value of this Rail-road as a public work, aswell as a private enterprise. They are persuaded that the business which they have in their previous reports anticipated, has not been over-estimated.

That it will furnish a desirable route between Boston and New York, will afford important advantages to a densely populated and manufacturing section of country, and will afford a mutual benefit to city and country, by restoring, in no small degree, to the city of Boston the business from Connecticut, which has been for many years withdrawn.

From the small amount of work to be done on the masonry, bridges and dressing the road-bed, the directors are enabled to estimate with considerable accuracy, that the expenses for the graduation, masonry, and bridges, for the entire Railroad, will be $526,545 85, being for fifty-eight and one-half, (the length of the road) $9,000 78 per mile

The following statement, by the engineers of the company, presents an estimate of the expenditures and receipts of the company for one year after it is in full operation.

The estimate of expenses is deemed too high; at the same time, it is believed that the calculations of the probable business on the road is by no means overstated.

Estimate of the annual expenses, renewals, repairs, &c., on the Norwich and Worcester Railroad:

1	Superintendant,		$2,000 00
2	Masters of transportation, at	$1,200	2,400 00
2	Clerks, at	800	1,600 00
50	Depot laborers and brakemen, at	350	17,500 00
8	Attendants at way depots and ticket offices, at	500	4,000 00
2	Termini ticket office clerks, at	800	1,600 00
3	Conductors, at	800	2,400 00
5	Enginemen, at	700	3,500 00
5	Firemen, at	350	1,750 00
78	men.		
	Secretary, treasurer, and other officers, say,		5,000 00
	Office expenses, advertising, &c.,		2,000 00
			$43,750 00
	Depreciations, renewals, and repairs of engines, cars, buildings, &c., $125,000, at 20 per cent.,		25,000 00
	Repair of road, renewals, &c., 60 miles, at $350,		21,000 00
	Fuel and oil,		20,000 00
			$109,750 00

Estimated annual receipts:

Say, 60 Boston and New York passengers each way, per day, equal to 120 passengers, at $2,	$240 00	
Say, Worcester and way travel, equal to 60 passengers over the road each way per day, or 120 passengers, at $2,50,	300 00	
Say 50 tons of freight, each way, per day, equal to 100 tons, at $3,50,	350 00	
	$890 00	
Receipts per year, 313 days, at $890,00 per day,		$278,570 00
Deduct annual expenses,		109,750 00
Balance,		$168,820 00

Equal to 12¼ per cent. on one and a half million of dollars capital. Three times the amount of business estimated would add very little to the annual expenses.

All which is respectfully submitted.

JOHN A. ROCKWELL,
JNO. BREED,
J. G. W. TRUMBULL,
RUSSELL HUBBARD,
A. F. GILMAN,
THOMAS ROBINSON,
G. S. PERKINS,
Directors.

NORWICH, *January* 31, 1839.

We, the subscribers, Commissioners of the Norwich and Worcester Railroad Company, appointed by the Governors of the states of Massachu

setts and Connecticut, having examined the foregoing, believe it to be correct, and approve of the same.

JOHN DE WITT,
Commissioner for the State of Connecticut.
CHARLES HUDSON,
Commissioner for the State of Massachusetts.

At a meeting of the Commissioners of the Norwich and Worcester Rail-road Company, at Worcester, in the Commonwealth of Massachusetts, on the 31st day of January, 1839, for the purpose of investigating the accounts and expenditures of said company, and for deciding what sums of expenditures made by said company are applicable to that part of said road lying in the state of Connecticut, and also what part is chargeable to that part of said road lying in the state of Massachusetts.

And having examined the accounts of said company, we do find that since the last settlement of the accounts of said company, which were brought up to Dec. 1st, A. D. 1837, up to the 31st Dec. A. D. 1838, embracing a period of thirteen months, there has been expended by said company, in the engineer department, $12,367 85, of which sum we apportion to that part of the Railroad lying in the State of Connecticut, the sum of $8,245 23; and to the portion lying in the State of Massachusetts, $4,122 62. In the carriage department, for cars, &c., there has been expended the sum of $2,189 14; of which, we put to Connecticut, $1,459 43; and to Massachusetts, $729 71. For salaries the sum of $5,872 49¼; of which, to Connecticut, $3,915 00¼, and to Massachusetts, $1,957 49. For contingent expenses, the sum of $3,424 73; of which, to Connecticut $2,283 15; to Massachusetts, $1,141 58. For office expenses, $737 82; of which, to Connecticut, $491 88; to Massachusetts, $245 94. And we find, by the books of said corporation, that there has been expended for real estate and land damages in Connecticut $45,198 22; for graduation, masonry and bridges in Connecticut, $102,607 38¼. For real estate and land damages in Massachusetts, $23,963 42; for graduation masonry and bridges in Massachusetts, $69,180 19, making the sum total expended by said company, during the above period of thirteen months in Connecticut, to be $ 64,200 20¼; in Massachusetts $101,340-95, making a total expenditure, during said period, of $265,541 24½

To which, if be added the sums expended as by our last annual report, viz: in Massachusetts, $115,276 89; in Connecticut, $361,849 28¼, will show a total amount as expended by said company, up to the 31st Dec. A. D., 1838, of $742,667 41¾

Said Commissioners also find, upon examination of the books of said company, said corporation have kept distinct and separate accounts of the expenditures in Connecticut and Massachusetts respectively, agreeably to the acts of said states, creating the present Norwich and Worcester Railroad Company.

All which is respectfully submitted, by CHARLES HUDSON,
Commissioner for the State of Massachusetts.
JOHN DE WITT,
Commissioner for the State of Connecticut.

WORCESTER, *Jan.* 31, 1839.

Third Annual Report of the Seekonk Branch Rail-road Company.

To the Honorable General Court of the Commonwealth of Massachusetts, begun and holden at Boston on the 1st Wednesday of January, A. D., 1839:

The Directors of the Seekonk Branch Rail-road Company respectfully report their acts and doings during the preceding year.

They have received the sum of . . . $19,993 00
They have expended the sum of . . . $21,235 06

The surplus of expenditure, and about three thousand dollars of the receipts, have been furnished by two of the building committee, and the remainder has been furnished by the share-holders of the company.

All which is respectfully submitted.

TRISTAM BURGES,
JOHN W. RICHMOND,
MOSES GILD,
JONATHAN BLISS,
Directors.

Fourth Annual Report of the Taunton Branch R. R. Corporation.

To the Honorable the Legislature of the Commonwealth of Massachusetts:

The Directors of the Taunton Branch Rail-road Corporation do hereby make the Fourth Annual Report of their acts and doings, receipts and expenditures.

On June 5, 1838, a new contract was entered into between this corporation and the Boston and Providence Rail-road Corporation, by which it is provided, that the passeng r and merchandise cars of this corporation shall be transported, between the junction of the two rail-roads, at Mansfield, and Boston and Providence, respectively, by the locomotives of the Boston and Providence Railroad Corporation; and that the latter corporation shall be entitled to receive the sum of fifty cents for each passenger, and the sum of one dollar for every ton of merchandise. This contract is to be in force for three years.

The total amount of capital paid in, is - - $249,825 00

The expenditures during the year ending November 30, 1838, have been as follows:—

Repairs on the rail-road, - - - -	$1,799 09
Repairs on the engines and cars, - - -	986 36
Miscellaneous expenses, including the amount paid to the Boston and Providence Rail-road Corporation for their proportion of the receipts, the cost of fencing the rail-road, interest, &c., - - -	32,180 60
Total amount of expenditures, - - -	$34,966 05

The receipts during the year ending November 30, 1838, have been as follows:

Amount of capital paid in, - - -	$21,000 00
Amount received for the transportation of passengers,	32,860 62
" " " merchandise,	12 876 78
" of other miscellaneous receipts, - -	2,999 59
Total amount of receipts, - - -	$70,336 99

Two dividends of three per cent. and two per cent., respectively, have been made in the course of the year, amounting, in the aggregate, to the sum of $12,500.

All which is respectfully submitted.

THO. B. WALES,
JNO. F. LORING,
WM. A. CROCKER,
SAM. FROTHINGHAM,
Directors.

Boston, Dec. 11, 1838.

Some Remarks on the Internal Improvement System of the South; by JOHN C. TRAUTWINE, Engineer-in-Chief of the Hiwassee Railroad.

FOR some time after the introduction of railroads into our Union, their construction was confined almost exclusively to the northern States. To Pennsylvania is due the credit of having been foremost in the cause of State railroads, as she had before been in that of State Canals. She has, through either her Legislature, or chartered companies, expended the heavy sum of thirty millions of dollars, in works more or less intimately connected with internal improvements. Large expenditures had also been made in Maryland, Delaware, New Jersey, New-York, the New England States and Virginia, for a considerable time before the importance of the internal improvement system appeared to manifest itself to the more southern portion of the Union; and with, I believe, the single exception of the South Carolina railroad in 1830, but little or nothing of importance had been done to further its advancement, until within the last three or four years.

The river Ohio, in connexion with the improvements of New-York and Pennsylvania, has hitherto been the great thoroughfare along which merchants of the west and interior have sought the markets of New York, Philadelphia, Baltimore, and other northern Atlantic cities; and along which they have in return transported to their several States, the goods purchased in those cities. South of the Ohio, they have never had offered inducements to visit the southern ports. Five or six hundred miles of miserable roads, nearly impassable in winter, have effectually shut out all intercourse between the merchants of the west and the Atlantic seaports of the south. The only rival of the northern cities in the trade of the north-western states, and of the interior, has been New Orleans; to which an easy access is had down the Mississippi river. But even there the trade has been confined principally to groceries, of which the sugar and molasses manufactured near New Orleans, constitute the principal items. As respects merchandize, the sales there are principally made to retailers living along the banks of the river, who send down produce to New Orleans, and receive return loads of groceries and merchandize in exchange. The *wholesale* merchants even along the Mississippi river, and of the states of Mississippi, Alabama, Georgia and Tennessee, as well as those of the north-western states, make their purchases in the northern cities; which in the sale of all articles of European manufacture, enjoy almost an exclusive monopoly. This is owing in a great measure to the superiority of the navigation between them and Europe, over that between New Orleans and Europe. Not only is the voyage to New Orleans the longer by more than 1000 miles, but it is rendered comparatively dangerous by the intricate passages, and obstructed navigation of the Bahama banks and capes of Florida.*

This objection, however, does not apply to the cities of the southern Atlantic seaboard. The navigation from Europe to Charleston and Savannah, is at least as good, if not better, than that to the northern cities. Moreover, the south would have a very important advantage over the north, in the mildness of her climate, which would allow merchants to

* Might not this difficulty be remedied in some measure, by the construction of a ship canal across the Isthmus of East Florida? Its length would probably not exceed 80 miles, and the country is very favorable for its construction. That common objection to canals, viz. their liability to obstruction by ice, would not apply here, owing to the mildness of the climate; the voyage would be greatly shortened and the most difficult and dangerous portion of it entirely avoided. This is one of the few instances in which we consider a canal infinitely preferable to a railroad. WRITER.

transport their goods at all seasons, without fear of obstruction from ice. Serious delays occur annually in the northern canals, from this cause. Let the south then open for the merchants of the west and interior, as good avenues to her seaports, as the cities of the north have done to theirs, and the monopoly of the latter must at once cease, and the south become a heavy importer. This she has finally resolved to do.

Within the last few years, the confidence which had been awakened in the south, by the increasing number of our northern projects, gradually became stronger; and as the success of these projects by degrees revealed itself in the realization of handsome profits, finally was confirmed. Thus experimentally convinced of the immense benefits resulting to the Atlantic cities of the north, from their numerous channels of intercourse with the west, she determined that she also would enjoy them.

This determination was promptly followed up by suggestions for various lines of railroad, stretching from the principal Atlantic cities of the south, to the interior of our Union; where their upper extremities are to be united to the lower termini of other lines, now being constructed in the north-western states of Indiana, Illinois, and Ohio, by which they will be extended even to the great lakes.

Through these connected lines of railroads, the merchants of the west will have as easy access to the seaports of the south, as to those of the north. The former will thus be enabled to effect an extensive importing system, and the heavy trade now monopolized by the north, will be distributed more equally along our entire seaboard.

A strong impulse has been given to the southern improvements by the lively interest taken in many of them, by the several states through which they pass; the consequence of which judicious policy is, that almost every individual state south of the Potomac and west of Pennsylvania, is at this moment engaged in forming its respective link in the grandest chain of internal improvements ever suggested; and one which will in less than six years from this time, effect an almost magical change in the commercial relations of the various sections of our country.

Fortunately for the south, she has conducted her operations thus far, with a spirit of unity and concert, much more marked than that which characterized the northern projects. Her several districts sensible that the prosperity of each depended on its means of ready intercourse with all the others, are constructing their respective lines with a view not only to the effecting of *local* considerations, but to the accomplishment of a magnificent project of *national* importance.

The most striking feature in the commercial aspect of the south, is her *Cotton growing*. The cotton country includes South Carolina, Georgia, Alabama, Mississippi, Middle and West Tennessee, and large tracts west of the Mississippi river. The great demand for this article over the whole globe, renders its cultivation far more profitable to the southern landholders, than that of the common agricultural products would be. Consequently the cotton country is devoted almost exclusively to its culture; a small proportion of rice constituting nearly the only exception. The cotton is pressed and put into bales at the place where it is grown; and thence sent by land to the nearest navigable stream, down which it is transported, principally in steamboats, to the various southern ports.

The business of most of the flourishing towns of the south, depends very essentially upon the receiving and exporting of cotton; all other things remaining as at present, many of them would probably cease to exist, with the demand for that article.

It follows from this general neglect of the farming interest, that the southern population must depend upon other sections for supplying them with provisions. These they receive from the interior and north-western states; but especially from Kentucky and East Tennessee, both of which districts, in point not only of agricultural, but of mineral and manufacturing resources and facilities, are excelled by no other portions of the Union.

From them, immense droves of live stock, and heavy amounts of provisions are annually sent to the cotton country, where the great distance and the wretched condition of the roads cause them to sell very high. On this account provisions command greater prices in the southern seaports than in any other part of the United States; and as the badness of the roads and the great length of hauling necessary, will not admit of an exchange for merchandize, the sales are almost always for *cash;* of which large sums are thus annually transferred from the south to the interior and north-western states. When the southern railroads shall be completed, this draining of cash from the cotton country, will in a great measure be counteracted by the sales of merchandize to the western merchants.

As before remarked, the universal demand for the staple product of the south, enables the southern seaports to do an immense *exporting* business. The raw cotton is from them shipped principally to Liverpool; and in England, that great manufacturing district for the whole globe, it is made up into goods, and in that state sent to every quarter of the earth.

A great quantity returns to this country; but not as one might at first suppose, to the *southern* seaports, from which the raw material was exported; it returns to the seaports of the *north;* because there the merchants of our immense interior congregate to make their purchases; and thus ensure a constant market.

But *why*, it will be asked, do the merchants of the interior prefer the seaports of the north, to those of the south? The answer is simply this, *because the roads are better.* The cities of the north have by a judicious system of internal improvements, opened for the western merchant, easy routes to reach their markets; and safe and speedy ones for carrying his purchases home. While Baltimore, Philadelphia, and New York have been contending with each other, for the supremacy, by each trying to excel the other in her channels of intercourse with the west, the south has stood idly by and done nothing. She has been content to permit not only the merchants of the interior, but even *her own, those residing in her own seaports*, to purchase their goods in the northern cities.

She forgot that the opening of every fresh avenue to the *north*, was the obstructing of one to *her;* and heartily joined in congratulations at the increasing prosperity of her sister, unmindful that it was secured at her own expense. "Better late than never," is a good old saying; and upon its inculcations has the south at last begun to act. She has commenced, and is now energetically pushing forward, a system of railroad improvements, which will soon present to the merchant of the interior, inducements to visit her seaports, as well as those of the north; and by purchasing his goods there, enable her to open a direct *importing* as well as *exporting* trade with the other continent.

But even with the manifold benefits which must result to Charleston and Savannah, from the completion of their railroads to the interior, we cannot, with many of our southern friends, look for those cities ever to attain the size and commercial importance of New York or Philadelphia.

From the very nature of the staple (cotton), which requires comparatively few landholders, it appears to us impossible that the population of the south can ever become so dense as that of the north; and the magnitude of a market must depend upon the number of purchasers. A large cotton grower can easily cultivate 1500 acres; while our wealthy northern farmers rarely hold more than 500; and perhaps the majority do not exceed 250. Besides this, the inexhaustible mineral resources, the manufacturing and agricultural advantages, the more equal distribution of wealth, and I may add, the more stirring and industrious business habits incident upon the colder climate of the north, all combine to render her cities more affluent than those of the south.

Still shall the south have attained that great desideratum, a termination of her mercantile dependance on the north. Her railroads will enable the merchant of the interior to purchase his goods alike in New-York, Philadelphia, Charleston or Savannah, as either may, from fluctuating causes, offer the best market. Instead of the heavy cash purchases of stock and provisions now necessary, an exchange of these articles for merchandize will be effected, and Savannah and Charleston will in a few years have attained an importance, with which their present condition will admit of no comparison.

But shall we permit the foreboding politician to predict from this termination of commercial dependence, a cessation of national dependence, of national feeling? Far from it. Community of intercourse will annihilate our local prejudices, will bury in oblivion the differences of by-gone times, and draw the bonds of union more close than ever.

We will now pass on to the consideration of the several lines of railroad by which the south hopes to accomplish the grand object in which she has embarked.

Illinois, Indiana, and Ohio are constructing several railroads from their respective interiors, to the Ohio river, and they are constructing some of them in such directions, that by uniting, they will form a continuous and very direct line of railroad from the "Far West," passing through Cincinnati to the Northern seaports. From Cincinnati to Philadelphia, by this line of railroad, is a shorter distance than from Cincinnati to Charleston, by way of the Charleston and Cincinnati railroad.

We wish these facts to be distinctly borne in mind by the reader, as we shall soon have occasion to bring them forward in support of some opinions of ours, which are opposed to those of many persons in the south, and therefore require strong arguments to sustain them.

First in importance, magnitude, and splendour of conception, of the several projects for benefiting the south by the effecting of an importing system, is the great Charleston and Cincinnati Railroad. Commencing at Charleston, this road occupies the line of the old South Carolina Railroad, as far as Branchville, 62 miles, thence it continues to Columbia, a further distance of 66 miles; thence to the North Carolina line, by a route not yet finally determined on, about 150 miles more; thence to Ashville, N. C., 41 miles; thence to the Warm Springs, 36 miles; thence along the valley of the French Broad River to Knoxville, 100 miles; (or 455 miles from Charleston to Knoxville;) from Knoxville it passes on through Lexington to Cincinnati by a route not yet finally adopted, about 265 miles; in all about 720 miles.

The company for constructing this road, is chartered by the four states through which it passses; viz. South and North Carolina, Tennessee, and Kentucky. Three of them, viz. North and South Carolina and Tennes-

see, have also granted banking privileges; Kentucky has not yet, but probably will do so this winter. South Carolina and Tennessee have also rendered pecuniary assistance to the road; North Carolina and Kentucky have not.

Independently of the tendency of this project, considered merely as a *Railroad*, great and beneficial results are to be hoped for, from its *banking powers*. The late derangement of the money market, has plainly pointed out the necessity for a circulating medium, based on other than restricted local credit; and such a mediumthe Charleston and Cincinnati Company will certainly effect, *in case the Railroad be completed.*

But if this be not done, we cannot see how the interest of the states through which it is to pass, can be enlisted in its cause; the circumstance alone of its *being chartered* by four states, cannot, it appears to us, prevent it from dwindling down into a mere South Carolina bank, with an influence and credit far less extensive than those of the present United States Bank, of Pennsylvania. To prevent this it will be necessary for Tennessee and Kentucky to lend themselves freely to the work. What has already been done is too trifling, in comparison with the magnitude of the project, to deserve a moment's consideration; it is for all practical purposes only *nominal.* We hope soon to see those two states awakened to a due appreciation of the utility of the undertaking, and embark largely in it.

From the city of Knoxville in Tennessee, there are laid down *two* continuous lines of Railroad to Charleston, S. C., one of these may be called the *northern or upper route*, and the other the *southern or lower route.* The upper one is that selected by the Charleston and Cincinnati Railroad and Banking Company; its length (as just now shown) from Knoxville to Charleston is 455 miles. The lower route consists of a chain of several distinct Railroads, commencing with the Hiwassee Railroad, 98½ miles in length, which extends from Knoxville to the dividing line of Tennessee and Georgia; where it unites with the Western and Atlantic Railroad, which continues 118 miles, to near Decatur in Georgia; thence the line runs to near Crawfordville 58 miles; thence by the Georgia Railroad to Augusta, 65 miles, thence by way of the South Carolina Railroad to Charleston, 136 miles, in all 475½ miles. From Crawfordville to Charleston 201 miles is already completed and in full operation; and between Crawfordville and Knoxville the line is now being graded with great energy. These two lines (the upper and lower) differ very materially in their characters, the upper route being the shorter by 20½ miles; but the lower possessing so great a superiority in point of levels and curves, as will, by admitting of greater speed, enable the trip to be made on it in less time than it can on the upper route.

The lower route affords the entirely unprecedented fact of a continuous chain of Railroad, nearly 500 miles in length, carried principally through a mountainous country, yet nowhere presenting a grade exceeding 36 feet to a mile; and at the same time unincumbered by tunnels or inclined planes.* Its shortest radius of curvature is 1000 feet; and even *it*, if we mistake not, occurs only on the Western and Atlantic Railroad; on the Hiwassee Railroad the minimum radius is 1400 feet, and occurs but twice; both being at

* There is, it is true, one inclined plane on the South Carolina Railroad, a few miles from Augusta; it was incurred when that road was first constructed, to gratify the inhabitants of the little town of Aiken. The extension of the road, as now taking place, was not, at that time, thought of; and as the business incident on the extension gradually increases, the plane will no doubt be dispensed with. Fortunately this can be very readily done.

the crossing of heavy ridges, and at the same time stopping places; on the other sections of the lower route, there is no radius under 1900 feet.

Even the minimum radius of 1000 feet, will with proper attention to details, admit of a speed of 20 miles per hour, with perfect safety; and this may, without fear of error, be assumed as *the least average speed* of the passenger trains, on the lower route; one of from 25 to 30 miles an hour, could readily be attained if necessary.

Each section of the lower route also presents nearly the same maximum grade, varying in none more than 3 or 4 feet; the maximum rise, as before remarked, being but 36 feet in a mile. This uniformity will admit of extreme regularity in the business operations of the several sections.

The wonderfully favorable character of the lower route is incident on the fact, that it occupies a series of vallies, running parallel to the immense mountain barriers, which nature has stretched as if in defiance of the efforts of art, almost uninterruptedly, from New York to the northern parts of Georgia. At the latter point we are enabled to curve round their lower extremities, and thus reach the sea board without crossing them.

On the other hand, the upper route is necessarily carried *across* these barriers, and must therefore encounter the heavy grades incident upon approaching them, and either the deep cutting, inclined planes, or tunnels, required for overcoming their summits.

Again, certain portions of the upper route, such as the deep valley of the French Broad River, and various mountain passes of the Blue ridge, are annually obstructed for several weeks by snow, ice and frost. This will create serious, if not *unsurmountable*, obstacles to regularity in the winter business; especially as the thinly scattered population of those parts, will not admit of the collecting of large forces of men to clear the road, as is frequently found necessary in the north.

On the lower route, ice and snow rarely occur at all; and *never* in sufficient quantity to cause a moment's interruption to Railroad travelling.

Again, the cost of the lower route will be so small in comparison with that of the upper, that it will be absolutely impossible for the latter to maintain a competition with it. Thus we see that in point of all the desiderata of Railroad travelling, in speed, safety, certainty and cheapness, the lower route is, by far, preferable to that selected by the Charleston and Cincinnati Railroad Company.

I have been thus particular in comparing the upper and lower routes from Knoxville to Charleston, that I might with the more apparent reason, urge upon the advocates of the Charleston and Cincinnati Railroad, the *immediate* construction of that portion of their road which lies *between Knoxville and Cincinnati*. The present intention of the company appears to be to construct the road gradually from Charleston upwards towards Knoxville, and thus on to Cincinnati; leaving, of course, the part between Knoxville and Cincinnati, some years behind the portion through South Carolina. Now it is very evident that a Railroad from Charleston, through the centre of South Carolina, even if it stop at the northern line of the state, will be of immense benefit to South Carolina, and particularly to Charleston; it will furnish an excellent communication between the interior of the state and her sea board; and this is very important to *her*; but is it important to the *stockholders?* Is it calculated to excite in Tennessee, Kentucky and the whole Union, the confidence which a Railroad from Charleston to Cincinnati was designed to effect? Why should a merchant, residing at a distance from the line, prefer a note of the South Carolina Railroad bank, to that of any other Railroad; and into a mere South Carolina Bank must the

whole scheme degenerate (at least for several years.) if the present intention be persisted in. And pray of what benefit is a line from Charleston to Knoxville to be at any rate, toward effecting an importing system, even supposing both the upper and lower routes to be completed thus far? Let us imagine for a moment that such were the case, and that the interval between Knoxville and Cincinnati remain as at present, traversed only by miserable common roads; can any man suppose that either route, or even their combined attractions, would operate to the value of one farthing, in diverting the trade of the "Great West" from along the Ohio river to the northern sea-ports, and turning it towards Charleston? Can he suppose that one merchant more would come from Illinois, Indiana, or Ohio, in consequence of it? Assuredly not. What is to induce the western merchant to exchange the splendid and cheap accommodations, the speed and comfort of his steamboat as he passes up the Ohio, for a rough, unsafe and expensive stage ride of some 200 or 300 miles by day and night, at 2½ miles per hour to Knoxville? Is it the love of adventure, in risking his life over the perilous mountain passes of Kentucky and Tennessee? I trust not, yet can I conjure up no better reason.

I hesitate not to predict that if the Charleston and Cincinnati Railroad Co. delay the construction of their road from Knoxville to Cincinnati, until after the completion of the remainder, the trade of the Great West will have become so fixed in its channel of the Ohio, and the line of Railroads before alluded to, parallel to that river, that the South will endeavour in vain to change it. Let her even *do her best*, the lines through Indiana, Illinois, Ohio, Pennsylvania and New York, will be completed before she can make the road from *Knoxville to Cincinnati*. What madness is it then to delay. While we are hesitating and discussing whether the upper or lower route *from* Knoxville to Charleston, be the better, we seem to forget that we have provided no means for bringing passengers and merchandize *to* Knoxville; and while, like the wolf and the bear, we are disputing for the prey which lies before us, a third party steps in and carries it away from both.

The course pursued in this matter by South Carolina, upon whose movements the whole machinery of the scheme depends, is by some ascribed (it appears to us uncharitably) to an existing jealousy between her and Georgia; by which South Carolina is supposed to be actuated to such an extent, as to decline all interference in any project in which Georgia should take part; and consequently prefer making an expensive road through her own territory, to availing herself of one of far superior character, through her rival State. Thus we see the upper end of the Charleston and Hamburg Railroad, and the lower end of the Athens and Augusta Railroad, like the two ends of a horse-shoe magnet, exercising a repulsive influence on each other, which bids fair to neutralize the otherwise general and beneficial action of this noble scheme.

To us it appears that the policy for South Carolina would be to enter into an amicable arrangement with the various companies constituting the lower route from Knoxville to Charleston, (of which route she already possesses 136 miles, in the Charleston and Hamburg Railroad,) and then construct the line from Knoxville to Cincinnati. By concentrating all her energies upon this interval, she would beyond all doubt, enlist both Tennessee and Kentucky deeply in the enterprise; for to both of those States, it is one of great importance; but so long as the present policy of working from Charleston upwards through South Carolina, is adhered to, the benefits of the undertaking are far too prospective, to induce any active interference in its behalf, on their part.

To adopt the course we propose, would probably lose to the company the charter of North Carolina; as the line would, in that case, not enter her territory. But of what importance is that consideration? Of what benefit is the Charleston and Cincinnati Railroad to be to North Carolina, in any event? It passes only through one of her counties, and that her extreme western one, and of a more sterile and mountainous character. Surely that is not sufficient to induce a hope that North Carolina will render any important aid to the project; whereas in the other case, as before said, both Tennessee and Kentucky would assuredly assist it to a very efficient degree; for both these States would need it for the exportation of their live-stock and provisions to the cotton country; and that alone, independently of any considerations of a southern importing system, should be a sufficient guarantee of profit, to warrant the immediate construction of the road through those two States.

We cannot anticipate much difficulty in procuring from the Legislatures of Tennessee and Kentucky, permission so to alter the charter, as to admit of the changes we propose. Legislative bodies, like private individuals, are influenced by *interest;* convince them that their present course is detrimental to their interest, and they will assuredly change it.

Perhaps the greatest real difficulty in way of the change lies in the company itself, not being willing to have its concerns divided into two branches, as would be the case if our ideas of uniting the Charleston and Cincinnati Railroad with the *lower route*, should be carried into effect. The Charleston and Cincinnati Railroad Company would then own only the road already constructed from Charleston to Augusta, and that, yet to be commenced, from Knoxville to Cincinnati; the interval between Augusta and Knoxville being in possession, as already stated, of several distinct companies.

Could the Charleston and Cincinnati company purchase this interval from the various companies now holding it, the difficulty would be at once removed; but we consider such an arrangement so utterly impracticable, that it is useless even to suggest it.

Great as the objection certainly is, to the division of the concerns of the Company, still it is obviously not an insuperable one. The case seems to us, nearly parallel to that of a merchant possessing flourishing business houses in two different cities.

Be that as it may, however, we cannot view the construction of the upper route from Knoxville to Charleston in any other light than that of a useless expenditure of money, unless it be looked upon as politic to purchase the good will of the districts through which it passes, by circulating among them at the expense of the company, the sums requisite for its construction. Even if finished, it can never sustain a competition against the superior merits of the lower route.

We are somewhat surprised at the course pursued by Kentucky in relation to the Charleston and Cincinnati railroad. She has lent no pecuniary aid to its construction, although she must necessarily derive great advantages from it. Her merchants will be provided with new markets for making their purchases; and the facilities for conducting her heavy exports will be greatly increased. The road will certainly not be made through Kentucky, unassisted by her pecuniary means; it is therefore to be hoped, not only on *her* account, but in a *national* point of view, that her opinions on the subject may assume a more favorable direction. We cannot but suppose that the adoption of the lower route would lead to such a change, and enlist Kentucky strongly in the cause.

We have hitherto spoken principally of *Charleston*, as striving to carry out measures for diverting part of the trade of the west, from the northern to the southern seaports by means of her railroads; we must now speak of her enterprising and spirited rival, Savannah. In point of magnitude Charleston is greatly superior to Savannah, containing a population of 43,000; while that of Savannah is but 10,000. The principal descriptive feature however between the two cities, as regards their importing facilities, consists in the superior harbor of Charleston; which is, we believe, confessedly the best along the Southern Atlantic seaboard.

There will however be no means left unresorted to, for rendering that of Savannah, in every respect perfectly eligible, and this its natural position admits of the more readily, since constructions in that branch of engineering are no longer involved in the uncertainty, by which, until the discoveries of late years, they were characterized.

Savannah is determined to be by no means behind Charleston, in her facilities of intercourse with the interior and north-western states; indeed if Charleston persevere in her scheme of the upper route from Knoxville, and insist upon conducting her transportation along it, Savannah will have the advantage of a far superior road; which, in our opinion, will much more than counterbalance any disparity which may exist between their respective harbors.

The *great Central Railroad of Georgia*, from Savannah to the city of Macon, near the centre of Georgia, is about 200 miles in length and is exclusively a company work. About 80 miles of it are already finished and in use; and the remainder is being rapidly progressed with. Like the lower route from Knoxville to Charleston, it is characterized by its unusually favorable features; and indeed the same remark may be applied to all the railroads in Georgia.

From the city of Macon the railroad is continued to the town of Forsyth, by the Monroe railroad, twenty-four miles in length; which will soon be (if it is not already) in operation.

From the city of Macon, is also to be constructed another railroad to the town of Talbotton; at which point it will branch off into two lines; one to West Point, to meet the Montgomery and West Point railroad; and the other to Columbus. Another branch from the Central railroad is also being surveyed, through the town of Waynesborough to Augusta, by which a union will be effected with the lower route from Knoxville. It will be forty-eight miles in length. Thus it will be seen that Savannah possesses quite as favourable avenues to the interior, as Charleston does; and if a bridge be not built across the Savannah river at Augusta, by which the South Carolina railroad may unite with the lower route from Knoxville, Savannah must receive the preference from western merchants. We are fully convinced that the want of a bridge at Augusta, and the selection of the upper route, by the Charleston and Cincinnati railroad company, will do more to decide the question of superiority between these two rival cities, than any other consideration possibly can.

About 70 miles south of Savannah is the seaport of Brunswick; at present a place of comparatively little importance; but destined, on account of its remarkably fine harbour, and its contemplated railroad connexion with Savannah, to become in a short time one of the most important of the southern ports.

Besides these Atlantic ports, others on the gulf Mexico, such as Appalachicola, Pensacola and Mobile will become termini of railroads from the interior; and will all be more or less similarly affected with Charles-

ton, Savannah and Brunswick; with, however, this great difference, that the dangerous navigation of the Bahama banks, at the mouth of the Gulf of Mexico, which must be encountered in a voyage to or from Europe, will always keep them secondary to the Atlantic ports. As before remarked, we think this might be obviated by a ship canal across East Florida; or, more imperfectly, by a railroad.

Appalachicola is at the mouth of the Appalachicola river, formed by the confluence of the Flint and Chattahoochie. The latter is navigable for steamboats for 200 miles, as far as Columbus; from which point, are lines of railroads to Cincinnati, by way of Knoxville; and also to Savannah and Charleston. At this time, Appalachicola is but a small town; it receives considerable amount of cotton from the upper parts of Georgia, by way of the river, but its importance will be increased greatly by its railroad connexions.

Similarly conditioned with Appalachicola, are Pensacola and Mobile. We have not in our possession, any very definite information respecting the railroad from Pensacola to Montgomery; we believe, however, that some progress has been made in its construction. From Montgomery, or rather from Fort Mitchell, (a point some distance above Montgomery) to West Point, is a railroad in a state of rapid progress. The reason for delaying the construction between Fort Mitchell and Montgomery is, that the river navigation between those places, although very circuitous, is sufficiently good for present purposes. The prolongation to Montgomery, will be made, as soon as the progress of the Pensacola railroad renders it advisable.

Through West Point passes also the Columbus and Chattahoochie railroad, leading from Columbus, to the Western and Atlantic railroad, near Decatur. This latter road will, like the Montgomery and West Point railroad, be rapidly pushed forward to completion.

The intercourse of Mobile with the interior, will be both through the same channel as that to Pensacola, and also through the Selma and Tennessee railroad, now under construction from the town of Selma to the Tennessee river, above Huntsville. This road is 170 miles in length. A branch is contemplated from near its upper terminus, along the valley of the Coosa river, to join the Western and Atlantic railroad, near New Echota. This branch will open to Alabama a communication to East Tennessee, by way of the Hiwassee railroad, to Knoxville; and thence by way of the Charleston and Cincinnati railroad to the Ohio; it is very important to all Alabama. We have heard of no contemplated branch from the Selma and Tennessee railroad to Tuscaloosa; but such a one will assuredly soon urge itself upon the public notice, in that section. The harbor of Mobile bay at the town being too shallow for large ships, and gradually becoming worse, it has been found necessary to construct a railroad 28 miles in length to Cedar Point on the Gulf, where the largest vessels lie in safety.

From the town of Wetumpka, above Montgomery, a railroad, is in progress, along the valley of the Coosa to Fort Williams; by which the obstructions in the river between those points, will be avoided. It is called the Coosa and Wetumpka railroad; and will be extended to unite with the Selma and Tennessee railroad, and with the lower route from Knoxville to Savannah and Charleston.

All these roads are constructed with the triple intention of expediting the carrying of cotton from the interior, to the several ports at which they terminate; of procuring provisions more readily from the agricultural

districts of Tennessee and Kentucky, &c. and of effecting an *importing system in the South*. The rivers of the South answer the purposes of intercommunication in but a very imperfect manner. In the summer they generally become unnavigable, for want of water It is well known that the Ohio trade is interrupted more or less every summer, from this cause; but in the streams still further South, the deficiency is felt to a much more serious extent. Thus the Tennessee river, *even in the most favorable seasons*, is rarely navigable for steamboats, even of moderate draft, for more than two or three months a year, as far up as Knoxville; and we have known intervals of very nearly a year to elapse, without a sufficient rise of water, for a single arrival. Pretty much the same, only not to so great a degree, may be stated of the river Cumberland, and the city of Nashville. The delays thus occasioned are extremely vexatious, and frequently productive of great inconvenience to the merchant.

We will remark, while speaking of Nashvillo, that we expect soon to see her interesting herself in the construction of a railroad, to meet the Western and Atlantic railroad near Ross' Landing, on the Tennessee river. The Western and Atlantic railroad branches into two lines, near its northern terminus; one going directly north, to meet the Hiwassee railroad; and the other passing in a north west direction, to the Tennessee river, near Ross' Landing. A communication between the latter branch and Nashville, would relieve that city from the embarrassments of the obstructed navigation of the Cumberland. Such a road, in connexion with the Hiwassee railroad, would constitute the best route between Nashville and Knoxville; it would be but a very few miles longer than the present stage road between those places. Its length would be about 100 miles.

Again, in order fully to perfect the importing system of the South, a ready communication is obviously necessary between her seaboard and the region west of the Mississippi river; as well as with the north-western States. Such a communication is in progress. It will extend from the upper terminus of the Selma and Tennessee railroad, to Memphis on the Mississippi. Of this very important line, the portion between Decatur and Tuscumbia (43 miles) has long been in operation; and that from Lagrange to Memphis, constituting the Memphis railroad, 50 miles in length, is in progress. The intervening spaces have not yet been commenced; but undoubtedly soon will be. It will be one of the most useful and lucrative lines in the Union. We look for much more of the Illinois trade with the Southern Atlantic ports to take this channel.

Before closing this paper, we cannot refrain from making a few remarks respecting Virginia and East Tennessee.

It is a common observation, that Virginia is behindhand in her internal improvements, and that she is not equalling her sister States in energy, and foresight. For ourselves we cannot subscribe to that opinion; the remark appears to us an unjust one. Virginia has already done much, and is still steadily progressing in a very extensive and costly system of improvements. To enumerate them would be foreign from our present purpose; we will only urge upon her the necessity of one more. We allude to a railroad from either Winchester, or Richmond, passing through the State in a south-western direction, through Wythe Court-house and Abington, to meet an extension of the Hiwassee railroad, at the Tennessee line near Blountville. This will form part of the *shortest and most eligible route from Maine to New Orleans, that can be obtained in the Union.*

Surveys have been made for the line from Richmond, and were favorably reported on; but unfortunately the requisite appropriations were not made for prosecuting the work. There can, however, be little doubt that the efforts which will be renewed at this session of the Legislature, will be successful. We consider the question one of immense interest to Virginia. Her fertile and far-famed valley has long been retrograding, for want of an outlet to markets, which would permit it to enter into competition with more successful candidates.

This portion of Virginia has depended very much for sales of produce, upon travellers, and upon the wagoners who haul into the interior the merchandize purchased in the northern cities. The travelling has gradually been diverted into other and better channels; and even the hauling of merchandize, is at the moment we are writing, about to give way to more expeditious and economical channels opened by the Railroads, constituting part of the lower route from Knoxville to Charleston; and which is now finished from Charleston northwards, upwards of 200 miles. By this route goods may be shipped from the northern cities to Charleston, and thence forwarded by railroads and waggons to East Tennessee, at a less expense than they can be hauled for across the valley of Virginia. No further reasoning is necessary, (though much more could be adduced) to convince Virginia of the necessity of prompt measures in relation to this road. Tennessee will readily co-operate with her, by filling up the interval between Knoville and Blountvile; and thus opening an *uninterrupted line of railroad from Maine to New Orleans.*

In East Tennessee, the reader will perceive that the Hiwassee railroad occupies a position peculiar to itself, and one of the utmost importance to all interested in it; viz. it is at the same time a portion of the great line from the N. E. to the S. W.; and of that from the S. E. to the N. W.; in other words, it is the *great cross road of the Union.*

The numerous mountain ranges which occupy the region extending for 200 miles on each side of it, forbid the construction of a rival road; and ensure to the Hiwassee rail-road two sources of income, either of which would alone be sufficient to warrant its construction.

This is the case, we believe, with no other rail-road in the country; and it offers to the stockholders, the best inducements to believe in the full success of their project.

We must now call the attention of capitalists and farmers, to the eastern section of Tennessee. We are certain we are within bounds, when we say that no portion of our Union presents more flattering prospects of a profitable investment in every department of manufacturers and agriculture, than East Tennessee.

She is the *nearest competitor* to the cotton growing country, in the sale of provisions and stock; her fertile vallies ensure abundant returns to the husbandman; her delightful climate is the most healthy in the Union; avoiding alike the extreme warmth of the South, and the extreme cold of the north. Her mineral resources of iron, lead, lime, gypsum, salt, coal, marble, &c., are inexhaustible. Her water power is unlimited and scattered over every part, to a most unusual degree; and finally a dense population is ready to insure success to the establishment of every kind of manufactory, and full employment to the mechanic in every department.

East Tennessee has hitherto held a peculiar position; hemmed in on all sides by mountains which almost preclude access, her merits have been overlooked. In other parts of the Union she is almost unknown;

we may freely venture to say that no portion of the Union is so little known to all the others, as East Tennessee; yet she occupies the very centre of them all. The same cause which has operated so powerfully to retard the growth of Charleston and Savannah, has exerted the same influence on East Tennessee, viz. *the want of good roads.*

These she is now engaged in making, and in a very few years she will burst upon the notice of her sisters, with almost as strong claims to novelty as a newly discovered country. JOHN C. TRAUTWINE.

KNOXVILLE, Nov. 1838.

Note.—The above is to be regarded as but a very cursory and imperfect sketch of the Southern Improvement System. Our object being merely to lay before the reader, some of its most important bearings.—*The Writer.*

(From the London United Service Journal for March.)

Civil Engineering in America.—By Captain Basil Hall, R. N.

For similar reasons to those which we used when speaking of the lake and river navigation of America, we should advise not only our civil engineers but our professional brethren of the United Service, to keep their eyes closely fixed on the state of steam navigation in that country. Force of all kinds, well disciplined and well directed, is no doubt the chief agent in war; but celerity of movement, combined with certainty, is the next most powerful principle in military matters, and therefore deserving of our constant attention. We have not adequate space to give any account of the various contrivances by which so vast a speed as 16 miles an hour is obtained in some parts of America; nor indeed could we, without drawings, render them fully intelligible to practical men. The arrangements, too, by which an immense number of persons can be stowed away without inconvenience, both below and above the deck, are highly worthy of the attention of officers whose duty it may become to transfer bodies of troops from place to place. By having the whole of the machinery, including the boilers and the furnaces, above the deck, the whole of the space below is left free for the accommodation of the passengers. In most of the American boats, Mr. Stevenson tells us, (page 135) 400 berths are made up. The principal cabin, he tells us, of the Massachusetts, a vessel running between New York and Providence, is 160 feet in length by 22 feet in breadth, and 12 feet high! "I have dined," says he, "with 175 persons in this cabin; and, notwithstanding this numerous assembly, the tables, which were arranged in two parallel rows, extending from one end of the cabin to the other, were far from being fully occupied." On the Mississippi and Ohio, the means of carrying numbers are greatly augmented by the erection of huge upper works, as high, in some cases, as the poop of a line-of-battle ship, in which several hundreds of additional passengers find accommodation—an arrangement which may be of vast consequence in war; for we have frequently seen steamboats on the western waters capable of conveying a whole regiment, baggage and all, either with or against the stream, at the rate of many miles an hour!

It is rather curious, that while the Americans adopt with avidity every new invention of ours, even when the advantages are questionable, we should be so very slow in availing ourselves of these discoveries of theirs which have been tried and found to answer well in practice. We are ready enough to accuse Jonathan of national vanity; but we believe he might with equal justice charge us with a stupid degree of false pride and imaginary superiority, which too often makes us slow to appropriate the discoveries of other nations.

We could quote many examples of this, but we shall confine ourselves to two. The first relates to the American mode of steering their steam boats in the bow, wherever they have to pass amongst crowds of shipping, or other impediments which render a straight course impossible, and which render it a matter of difficulty and often of danger, and always of delay, where the helmsman is so placed as not to see his way before him. In spite of the full knowledge of the many advantages arising from this method of steering in such a narrow and crowded river as the Thames; in spite of the perfect facility of fixing the apparatus; and in spite of the complication, trouble, noise, confusion, and risk which attend the present mode of steering abaft, and in spite of the plan of steering forward having been already tried and found to answer, all our boats, (except, we believe, a single vessel, the Royal Adelaide, plying between Loudon and Leith,) are still fitted with the absurd plan of steering from the stern!

The other contrivance, which we ought long ago to have adopted from the Americans, relates to the form of the paddle-wheels. "The float boards," says Mr. Stevenson, "do not extend across the whole breadth of the paddle-wheel, as is always the case in this country; they are divided into two, and sometimes three compartments." This construction, we learn from Dr. Renwick's Treatise on the Steam Engine, was introduced by Mr. Stevens, of New York, "and may be described," he says, "by supposing a common paddle-wheel to be sawn into three parts, in planes perpendicular to the axis. Each of the two additional wheels thus formed is then moved back, until their paddles divide the interval of the paddles on the original wheel into three equal parts. In this form," continues Dr. Renwick, "the shock of each paddle is diminished to one-third of what it is in the usual shape of the wheel; they are separated by less intervals of time, and hence approach more nearly to a constant resistance: while each paddle following the wake of those belonging to its own system, strikes upon water that has been but little disturbed."

We have lately seen with much satisfaction a modification, and we believe, an improvement of this plan, has been hit upon by Lieut. Hall, who has devised a diagonal set of float-boards, for the paddle-wheels of steam boats, and which, we understand, entirely does away with the disagreeable tremor caused by the ordinary float-boards striking the water. In Lieut. Hall's wheels the paddles are placed in such a manner, that they enter the water at one end, and glide through it, as it were, without producing any blow, or concussion.

It may be mentioned, that from the immense diameter of the American paddle-wheels, about 25 feet, and the circumstance of their having always, or almost always, smooth water in which to work them, the cycloidal paddle of Mr. Galloway, or the eccentric paddle of Mr. Morgan, which have been so successfully used in this country, are not required on the American rivers.

We are unwilling to quit this branch of the subject without calling the attention of the rising generation of our naval officers to the importance of their turning their attention to steam, not merely as a matter of curiosity, but as a matter of duty. We should say, without qualification, that at this moment we know of no way so likely to lead to an officer's advancement as that which this subject affords. Let any officer of proper zeal and good capacity, who is willing to work out his promotion, set to work in earnest to study steam machinery, and its adaptation to navigation. Let him take his jacket off, and put on a paper cap, be regardless of soiling his fingers or scorching his face, and submit to the companionship of thorough

bred workmen in Maudslay's works in London, or those of Napier in Glasgow, until he has made himself completely master of every one of the multifarious details upon which the merits of this wonderful contrivance depends. Let him take a trip or two as assistant-engineer in a steam boat. Let him also read such books as will give him a theoretical knowledge of the chemical and mechanical principles of the agency of steam, and we will guarrantee him his eventual promotion, whether the peace continues or not. We should be disposed, certainly, to make such knowledge in a greater or less degree a requisite to every officer's passing; and hold no one to be eligible to a commission who should not be able to prove his acquintance, at all events, with the elementary principles of the steam-engine, which now-a-days are to the full as important for him to know as the elements of navigation, seamanship, or gunnery.

Mr. Stevenson's chapter on fuel and materials, though chiefly interesting as a picture of a state of things widely different from any which is to be found in Europe, contains one or two things which are incidentally deserving of our notice. Ship-building and carpentry have been brought to high perfection in America, and, as we may suppose, the trade in wood, or as it is called, the lumber trade, is carried on to a great extent on most of the American rivers, and affords employment to a vast number of persons. We have often thought, when looking at the raft, constructed by these people, how important, under some circumstances, they might be made in a campaign; at all events the following sketch of their constuction will probably be new to most of our readers:—

"The chief raftsmen are generally persons of intelligence, and possessed of considerable capital. They often purchase a piece of land, which they sell again after they have cropped the timber off it, and sometimes for more than they paid for it originally. The chief raftsman, and his detachment of workmen, repair to the forest about the month of November, and are occupied during the whole of the winter months in felling trees, dressing them into logs, and dragging them with teams of oxen on the hardened snow, with which the country is then covered, to the nearest stream. They live during this period in huts formed of logs. Throughout the whole of the newly cleared districts of America, the houses are built of rough logs. The logs are arranged so as to form the four sides of the hut, and their ends are half-checked into each other in such a manner as to allow their coming in contact nearly throughout their whole length, and the small interstices which remain are filled up with clay. About the month of May, when the ice leaves the rivers, the logs of timber that have been prepared and hauled down during winter, are launched into the numerous small streams in the neighborhood of which they have been cut, and floated down to the larger rivers, where their progress is stopped by what is called a "boom." The boom consists of a line of logs, extending across the whole breadth of the river. These are connected by iron links, and attached to stone piers built at suitable distances in the bed of the stream. The boom is erected for the purpose of stopping the progress of logs, which must remain within it till all the timber has left the forest. After this, every raftsman searches out his own timber, which he recognises by the mark he puts on it, and having formed it into a raft, floats it down the river to its destination. The boom is generally owned by private individuals, who levy a toll on all the wood collected by it. The toll on the Penobscot river is at the rate of three per cent on the value of the timber; and the income derived from the boom is about 300*l* per annum.

"The rafts into which the timber is formed, previous to being floated

down the large rivers, are strongly put together. They are furnished with masts and sails, and are steered by means of long oars, which project in front as well as behind them. Wooden houses are built on them for the accommodation of the crew and their families. I have counted upwards of 30 persons working the steering oars of a raft on the St. Lawrence; from this some idea may be formed of the number of their inhabitants.

"The most hazardous part of the lumberer's business is that of bringing the rafts of wood down the large rivers. If not managed with great skill, they are apt to go to pieces in descending the rapids; and it not unfrequently happens, that the whole labor of one, and sometimes of two years, is lost in a moment." p. 179. "The safest size for a raft," Mr. Stevenson tells us, "is from 40,000 to 50,000 square feet, which requires five men to manage it. Some rafts extend to the enormous size of 300,000 square feet. These huge floating islands are brought to Quebec from distances varying from 100 to 1200 miles! and it often happens that six months are occupied in making the voyage."

There has been so much written already about the canals and railways of America, that we are scrupulous of occupying so much of our readers' time as would be requisite to give any detailed view of these operations. But we have been greatly interested in reading Mr. Stevenson's work, with the marvellous energies and ingenuity by which so many undertakings have been carried through; and we should say, that in a variety of important professional points of view, a study of their details cannot fail to be useful to officers, and particularly to our military engineers, to whose operations in the field, it is curious to remark, not a few of the works alluded to are closely allied. A simple enumeration of some of the principal objects which the Americans have had in view will make this apparent; while the result is highly encouraging, and we should say strictly in military character.

"Their purpose has been," says Mr. Stevenson, "to remove all obstructions in navigable rivers; the junction of different tracts of natural navigation; the connexion of large towns; and the formation of levels of communication from the Atlantic Ocean to the Great Lakes, and the valleys of the Mississippi, Missouri, and Ohio.

"The aggregate length of the canals at present in operation in the United States alone amounts to upwards of 2,700 miles; and that of the railways already completed to 1600 miles. Nor are the labors of the people at an end; for even now, there are no fewer than 33 railways in an unfinished state, whose aggregate length, when completed, will amount to upwards of 2500 miles. Now, although we are well convinced that many of these undertakings, like many similar projects in this country, will prove ruinous to the speculators and entirely abortive as works of public utility, yet it shows an ardor in the pursuit of improvement well worthy of being closely watched by those whose duty it may become to establish lines of communication between place and place."

It must be recollected however, in considering these matters, that the Americans have extremely few roads, and these very bad; so that their railroads and canals are intended to do the work of exclusive roads, not to supersede their use, as is proposed with us in many cases. With us the Railroads are intended as an accelerated mode of communication between places already open to one another; in America, in most instances, they are the first and only highways; and what renders these operations more wonderful, is, the circumstance of many of them being carried for hundreds of miles in a trough, as it were, cut through thick and here-

before impenetrable forests, where, as Mr. Stevenson adds, "it is no uncommon occurrence to travel for a whole day, without encountering a village or even a house, excepting perhaps a few log huts inhabited by persons connected with the work." The fudamental principles by which the engineers of America and of this country are guided, are of course the same; but the nature of the materials employed by them respectively, and the climate and other circumstances of the two countries, are so dissimilar, that a considerable variety must exist in the practice of their civil engineers. From not attending to these distinctions, we have known many people run into material errors in judging of American affairs; and we conceive that for the purposes of instruction in habits of resource—on which account chiefly we call the attention of officers to such details—it is essential that these differences of circumstance should be kept constantly in view.

The following account of the canal travelling in the backwoods is not very tempting:—

"The canal travelling in many parts of America is conducted with so little regard to the comfort of passengers, as to render it a very objectionable conveyance. The Americans place themselves entirely in the power and at the command of the captains of the canal-boats, who often use little discretion or civility in giving their orders; and strangers, who are unaccustomed to such usage, and would willingly rebel against their tyranny, and are in such cases compelled to be guided by the majority of voices, and quietly to submit to all that takes place, however disagreeable it may be. About eight o'clock in the evening, every one is turned out of the cabin by the captain and his crew, who are occupied, for some time after the cabin is cleared, in suspending two rows of cots or hammocks from the ceiling, arranged in three tiers, one above another. At nine the whole company is ordered below, when the captain calls the names of the passengers from the way bill, and at the same time assigns to each his bed, which must immediately be taken possession by its rightful owner on pain of his being obliged to occupy a place on the floor, should the number of passengers exceed the number of beds, a circumstance of very common occurrence in that locomotive land I have spent several successive nights in this way, in a cabin only 40 feet long by 11 feet broad, with no less than 40 passengers; while the deafening chorus produced by the croaking of the numberless bullfrogs that frequent the American swamps was so great, as to render it often difficult to make one's-self heard in conversation, and of course, nearly impossible to sleep. The distribution of the beds appears to be generally regulated by the size of the passengers; those that are heaviest being placed in the berths next the floor. The object of this arrangement is partly to ballast the boat properly, and partly, in the event of a break-down, to render the consequence less disagreeable and dangerous to the unhappy beings in the lower pens. At five o'clock in the morning, all hands are turned out in the same abrupt and discourteous style, and forced to remain on deck in the cold morning air while the hammocks are removed and breakfast is in preparation. This interval is occupied in the duties of the toilette, which is not the least amusing part of the arrangement. A tin vessel is placed at the stern of the boat, which every one fills for his own use from the water of the canal, with a gigantic spoon of the same metal: a towel, a brush, and a comb, intended for the general service, hang at the cabin door, the use of which is fortunately quite optional."

We have already slightly alluded to the *Slackwater* navigation of America, but as we can easily imagine cases in which the principle might be

brought into great play in war, we shall give a word or two more respecting the method. "It consists," says Mr. Stevenson, "in improving the navigation of a river by erecting dams or mounds built in the stream, which have the effect of damming up the water and increasing its depth. If there be not a great fall in the bed of the river, a single dam often produces a stagnation in the run of the water, extending for many miles up the river, and forming a spacious navigable canal. The tow-path is formed along the margin of the river, and is elevated above the reach of the flood-water. The dams are passed by means of locks, such as are used in canals."

The river Schuylkill, from Philadelphia to Reading, a distance of upwards of 100 miles, is made subservient to this purpose by means of 34 dams thrown across the stream, together with 29 locks, which overcome a fall of 610 feet.

On soms of the American canals, the boats are moved from different levels by means of inclined planes instead of locks. The whole rise and fall on the Morris canal is 1557 feet, of which 223 are overcome by locks, and 1324 feet by 23 inclined planes. The boats are 8½ feet wide, by 60 or 80 long, and vary from 25 to 30 tons burden; but the greatest weight ever drawn up the planes is about 50 tons.

The chapter on road-making offers but little from which we can derive much direct instruction of a military kind; but there are many useful hints in it, of which any officer might avail himself, such as those which relate to the readiest way of forming a roadway out of timber laid either corduroy fashion, across the path, or in billets inserted perpendicularly, like a tesselated pavement.

No people have worked more at the science of wooden bridges than the Americans, and we should gladly have said a good deal on this point, so important to military engineers, could we have made our comments intelligible without the assistance of drawings. We recommend therefore, Mr. Stevenson's eighth chapter to the attention of those who are curious in civil engineering, and especially to that section of it which describes 'Town's Patent Lattice Bridge,' which is much employed on the American railways. This construction is sometimes used for bridges of so large a span as 150 feet, and it exerts no lateral thrust tending to overthrow the piers on which it rests. A small quantity of materials also, of very small scantling, arranged according to this plan, possess a wonderful degree of strength and rigidity.

The railways of America occupy nearly as much of the public attention as those of England do with us; and we confess that we are not without great fears that the rage for this description of speculation will end in disappointment. Be this as it may, we are sure that many of the details which Mr. Stevenson gives us respecting the method of fixing the rails, and other particulars respecting the American lines, may be profitably studied by the engineers on this side of the water. What has struck us with most admiration, is the cheapness of the American Railroads, which is caused, first, by their being exempted from the heavy expenses often incurred with us by the purchase of land, and the compensation damages. The poor Indians and the wild beasts are more readily dealt with than our sturdy land-owners; and to drive a Railroad through an American pine-barren (as the vast forests of that timber are called.) is quite a different affair from intersecting an English country gentleman's pleasure grounds. Secondly, the works themselves are seldom, if ever, executed in as substantial or costly a style as with us; and thirdly, the wood, which

is their principal material, is obtained at a very small cost. The first six miles of the Baltimore and Ohio Railroad, which is said to be formed "in an expensive manner, and on a very difficult route," has cost on an average about 12.000*l.* a mile. The Railroads in Pennsylvania cost about 5000*l.* a mile; and the Albany and Schenectady line, upwards of 6000*l.*; the Schenectady and Saratoga Railroad, 1800*l* a mile. And it appears that the average cost of the Railroads throughout the Union, is about 4942*l.* per mile. "This," observes Mr. Stevenson, "contrasts strongly with the cost of railways constructed in this country. The Liverpool and Manchester railway cost 30,000*l.* per mile; the Dublin and Kingston 40,000*l.*; and that between Liverpool and London is expected to cost upwards of 25,000*l.*" Mr. Stevenson gives an account, in very workmen-like and satisfactory detail, of the great Pennsylvania canal and Railroad, one of the most wonderful works any where existing in the world. The whole distance from Philadelphia to Pittsburg is 395 miles; 118 of which are on Railroads, and the remaining 277 on canals. The average rate of travelling is indeed rather slow, being not quite four and a half miles per hour, owing to the numerous inclined planes, and other sources of delay, described at length in Mr. Stevenson's book. The charge made for conveying each passenger is 3*l.* or about 2*d.* per mile! In concluding the subject of railways in America, we only remark, that there seems to be much going on at this moment in that country more worthy of our attention, as military engineers, than upon almost any other branch of their industry. And we ground this observation upon the peculiar nature of the circumstances, which resemble not a little those of an army acting in a country where the grand object was to get along at all hazards. It may seem, at first sight, a very simple affair to cut a track through a forest, but experience shows it to be one of considerable labor and expense. "This operation is called 'Grubbing' in America, and is scarcely at all known to the engineers of this country, who are as tender of other people's trees as of their own children, and costs from 40*l.* to 80*l.* per mile; according to the size and quantity of timber to be removed. The whole topic, too, of inclined planes worked by stationary engines, is one of great novelty and interest; and we have been much surprised with the working capabilities of some of these apparently cumbersome devices for gaining level. On the Pennsylvania canal, Mr. Stevenson tells us, "that the longest plane is about 3000 feet; the time occupied in moving up and down is five minutes; the time occupied in attaching is two minutes and a half, making seven minutes and a half, or eight drafts per hour of three loaded cars carrying three tons each, making twenty-four cars, or seventy-two tons per hour." There appears to be as yet only one railway in the British dominions in North America, viz., between St. John's on Lake Champlain and the village of La Prairie, on the St. Lawrence. It is sixteen miles in length, and is worked by locomotive engines. This is rather strange, and we think somewhat disgraceful; but we trust that when the affairs of the Provinces are duly settled, and that men's minds have had time to return to the consideration of real business, in contradistinction to political excitement, this subject, amongst others, will not be longer neglected by the inhabitants of those magnificent countries. We do not see, indeed, how the Nova Scotians, for example, can escape from the unanswerable arguments of the Clock-maker, who, if he succeeds (as we think he will,) in rousing his countrymen to a sense of their own best interests, will render the name of Sam Slick as justly renowned in the Provinces, as that of Benjamin Franklin in the adjacent States.

Trinidad.—Lake Pitch.

The Trinidad papers contain some interesting particulars, relating to an experiment recently made at that Island, on board the steamer Pluto, Lieut. Lunn, in the use of Pitch from the Lake, as a substitute for coal, in generating steam. The Bermuda Gazette, in transcribing the particulars, offers the following remarks:

"The trial, though made under many disadvantages, proves that this pitch will form a most excellent fuel, and that when used with coal, the proportions should be about two thirds of the former to one of the latter. We learn from a gentleman lately arrived here from Trinidad, that several of the estates, particularly those in the neighborhood of the lake, have for several months past, been using the pitch as fuel, in the boiling houses, and that they have found it a most valuable and economical substitute for coal, which article has occasionally, in that island, it seems reached the enormous price of twenty dollars per hogshead.—We also learn that there are at the present period, agents at London and Paris, who are actively engaged in collecting the pitch for transportation, and that several large vessels have already been despatched to England and France, laden with this novel article of commerce. One of these Companies, we believe the Parisian, has offered the Colonial Government the sum of 20,000*l* for the exclusive privilege of working the mine; but this offer was, it seems rejected; the Government deeming it more advisable that it should, for the present at least, be free to all, than be monopolized by any trading company. Guthrie, in his Geography, says that "there is in Trinidad a remarkable production of nature, being a bituminous lake, or rather plain called Tar Lake, about three miles in circuit. The substance which is here found has the consistence and aspect of pitch coal; it breaks into glossy fragments of a cellular appearance; a gentle heat renders it ductile, and mixed with grease or common pitch it is used for smearing the bottom of ships. In many parts of the woods it is found in a liquid state.

The Governor of Trinidad has recently ordered a topographical survey of the pitch lake, as also its elevation above the sea, to be ascertained. Although immense quantities of the pitch have been shipped, still there does not appear to be the least diminution in the size of the lake, and it is asserted that there is a sufficiency of it "to supply a whole navy of steam vessels for centuries with fuel."

This pitch, for the most part, we are told, is shipped in bulk; that which is obtained in a liquid state is, however, put into barrels; but the utmost care is requisite in packing it, as it dilates much.

At a period like the present, when the attention as well of the Governments of Europe and America, as of the commercial and speculative interests of both continents, is particularly directed to the use of steam navigation, the discovery of the properties of this pitch will, we conceive, be of the utmost importance, not only to Trinidad, but to the whole of the West Indies, and could it not, we ask, be also turned to the advantage of Bermuda? The favorable position of these islands as a general rendezvous for crossing the Atlantic, either to British America or the United States, is on all sides admitted; and now that the facilities for obtaining fuel are increased, and as our vessels trading with fish to Trinidad, could at a very trifling charge make extensive deposits of the bitumen here, we trust that the attention of Government, as well as of steam navigation companies, will be directed to the circumstance.